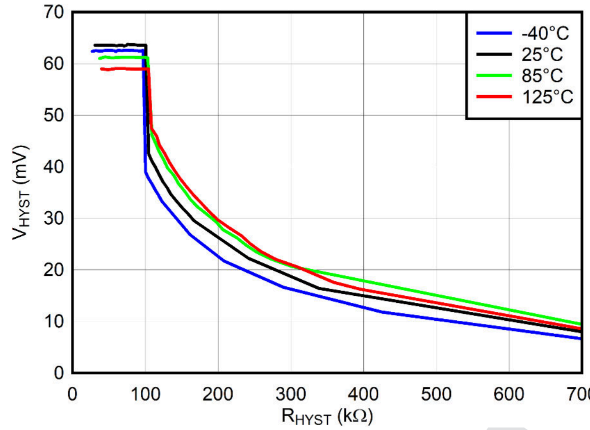

Figure 8-4. V_{HYST} (mV) vs R_{HYST} (kΩ), V_{CC} = 3.3V

8.2 Typical Application

8.2.1 Non-Inverting Comparator With Hysteresis

A way to implement external hysteresis to the TLV3604 is to add two resistors to the circuit: one in series between the reference voltage and the inverting pin, and another from the inverting pin to one of the differential output pins.

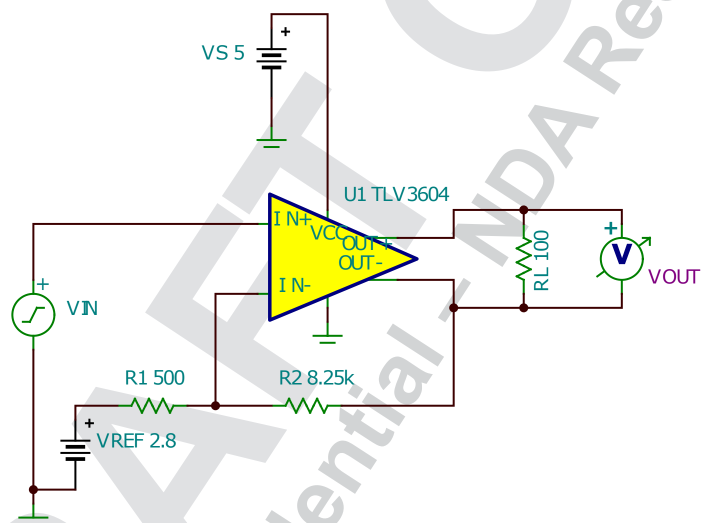

Figure 8-5. Non-Inverting Comparator with Hysteresis Circuit

8.2.1.1 Design Requirements

Table 8-1. Design Parameters

PARAMETER	VALUE
V_{HYS}	20mV
V_{REF}	5V
V_{T1}	3.6V
V_{T2}	3.4V
Q	1.375V
$\overline{Q}$	1.025V

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8.2.1.2 Detailed Design Procedure

First, create an equation for V_T that covers both output voltages when the output is high or low.

$$V_{INN\_LOW} = V_{REF} - (V_{REF} - V_{OL}) \times R_1 / (R_1 + R_2) \tag{1}$$

$$V_{INN\_HI} = V_{REF} - (V_{REF} - V_{OH}) \times R_1 / (R_1 + R_2) \tag{2}$$

The hysteresis voltage in this network is equal to the difference in the two threshold voltage equations.

$$V_{HYS} = V_{INN\_HI} - V_{INN\_LOW} \tag{3}$$

$$\text{After simplifying: } V_{HYS} = (V_{OH} - V_{OL}) \times R_1 / (R_1 + R_2) \tag{4}$$

Since input bias is typically 1 µA, it is best to choose a value for R_1 and then solve for the required R_2 to provided the needed amount of hysteresis. In this example, a value of 500 Ω was selected to minimize the impact of input bias current on circuit offset voltage. Solving for R_2 provides the equation below. Note that VOD is 350 mV from the EC Table.

$$R_2 = R_1 \times (V_{OD} - V_{HYS}) / V_{HYS} \tag{5}$$

VREF can now be solved for using the equation for VINN_LOW or VINN_HI. IN this example, VINN_HI was chosen.

$$V_{REF} = (V_{INN\_HI} - k \times V_{OH}) / (1 - k) \text{ where } k = R_1 / (R_1 + R_2) \tag{6}$$

The external hysteresis design is now complete with R_1 = 500 Ω, R_2 = 8.25 kΩ, V_{REF} = 2.8 V.

8.2.1.3 Application Performance Plots

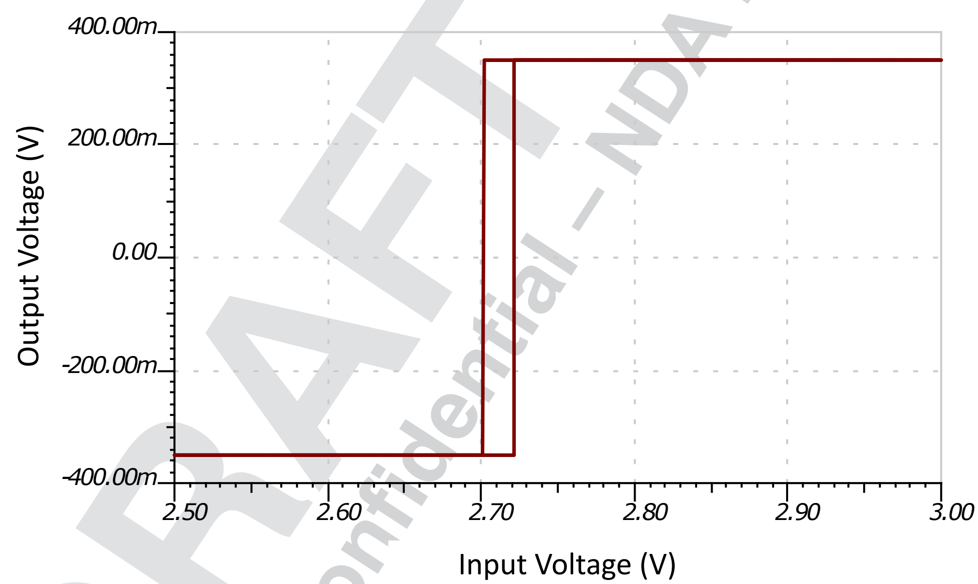

Figure 8-6. Hysteresis Curve for LVDS Comparator

8.2.2 Optical Receiver

The TLV3604, TLV3605, and TLV3607 can be used in conjunction with a high performance amplifier such as the OPA855 to create an optical receiver as shown in the Figure 8-7. The photo diode is connected to a bias voltage and is being driven with a pulsed laser. The OPA855 takes the current conducting through the diode and translates it into a voltage for a high speed comparator to detect. The TLV3604, TLV3605, and TLV3607 will then output the proper LVDS signal according to the threshold set (V_{REF2}).

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